Alfa Laval Defender 500

The ultimate solution for crankcase ventilation

The Alfa Laval Defender 500 oil mist separator is a unique product, designed to efficiently clean ventilated crankcase exhaust gases in diesel and gas engines.

Installing this unit directly to the crankcase breathing channel allows oil droplets to be quickly removed and returned to the oil sump. The Defender 500 is sealed for life and requires no maintenance during its lifetime.

Application

The engine crankcase gas originates from combustion gases that leak down to the crankcase from the combustion chamber via gaps between the cylinder wall and the piston rings. In order to prevent over-pressurizing the crankcase, this gas must be continuously ventilated from the crankcase.

Alfa Laval's Defender 500 oil mist separator removes oil droplets from the ventilated gas using Alfa Laval's patented disc stack centrifugal separation technology. The collected oil returns to the engine oil sump via the drain pipe. The cleaned gas is then vented to the surroundings for an open system (OCV), or returned to the air intake of the engine for a closed crankcase ventilation system (CCV).

Insufficiently cleaned gas that is returned to the intake of the engine, as in a CCV system, can lead to a number of problems. The efficiency of the turbocharger drops due to coke deposits on the turbocharger compressor wheel and the intercooler performance is reduced as oil accumulates, eventually clogging it. Efficient cleaning with Defender 500 minimizes coke deposition and extends the service life of the turbocharger and intercooler, hence helping maximize the lifetime and operation performance of the engine.

Design

The Alfa Laval Defender 500 oil mist separator is designed for a built-on-engine installation, with maintenance free operation and high separation performance for the toughest engine duties. New, off-road features make the Defender 500 even more resistant to higher operating temperatures and enabling operation at greater angles of roll and pitch, such as those encountered in marine, military, off road or rail. The all-metal casing and hose/pipe connections contribute to the robustness and minimize the risk of fatigue damage.
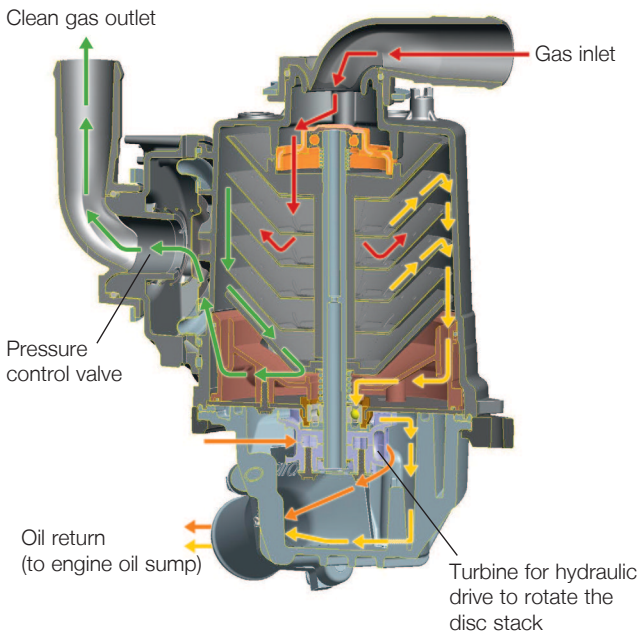

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Utilizing the latest Alfa Laval gas separation disk stack technology combined with hydraulic drive, gives Defender 500 both a high gas flow capacity and consistently high separation efficiency performance over its lifetime. Efficiency is typically >98%. The hydraulic drive and the self lubrication of the bearings make the Defender 500 suitable for variable as well as full load engine duties in extreme weather conditions.

A mounting bracket, 90° angle inlet/outlet connections and a generic hose nipple for the oil return make Defender 500 easy to fit on the engine.

Operating principle

Alfa Laval's core technology in centrifugal separation technology and experience with engines make developing a dedicated product for engine crankcase gas cleaning possible. Using a small efficient turbine, powered by minimal oil pressure from the engine, enables the rotor and discs to spin. The rotation creates a centrifugal force enabling separation of the heavier oil droplets and soot particles from the ventilated gas. The oil and soot are forced off the discs onto the separator housing wall where they drain to the bottom chamber of the housing, mixing with the returning drive oil and drain back to the sump.

In addition to being a separator unit, the rotating disc stack works as a fan that extracts gas from the crankcase. Therefore, there is no pressure drop across the unit. An internal pressure control valve ensures the crankcase pressure is within a suitable working range, despite potential pressure variations; hence, the Defender 500 serves as a complete engine crank case ventilation system including cleaning and pressure control.

Clean gas outlet

Gas inlet

Pressure control valve

Oil return (to engine oil sump)

Turbine for hydraulic drive to rotate the disc stack

Features and benefits

- High performance disc stack technology with cleaning efficiency >98%

- Protects turbocharger and intercooler, hence maintaining a high performing engine and prolonging the engine life for closed ventilation systems

- For single or multiple installations covering a wide capacity range

- "Fit & Forget" – No service throughout its lifetime

- Minimises engine oil consumption, due to oil return and reuse of drive oil

- No disposables or recycling – eliminates the need for replacement filters

- Can be fitted to any gas or diesel engine

- Actively extracts gases from the crank case – no pressure drop

- Integral pressure control valve – stable crank case pressure

- No external power to drive the separator

Technical data

* Blow-by flow rate (l/min.)

High efficency nominal [1]	300
Recommended maximum [2]	500

[1] At optimal conditions efficiency is higher than 98% at nominal blow-by
[2] This value depends on the boundary conditions for separation efficiency and crankcase pressure

* Oil in blow-by (g/h)

Recommended maximum [3]	40

[3] This value depends on the boundary conditions for separation efficiency

Temperatures (°C)

Max. blow-by gas temp.	130
Max. oil temp.[4]	140
Min. ambient temp.	-40
Max. ambient temp.[4]	140

[4] Percentage above 120°C: 5% max.

* Drive oil

Recommended drive oil pressure	3.5 Bar – 6 Bar
Typical drive oil flow rate	600 - 800 l/h

Others

Max. temporary leaning.[5]	30°
Crankcase pressure window	-5 mBar to -20 mBar
Max. pressure drop.[6]	40 mBar

[5] Leaning of separator may cause a slight cleaning efficiency drop
[6] Measured from crankcase to separator inlet

* Values based on one separator per system. Two separators give twice the values and there separators give three times the values etc.

Dimensions

Total height	274 mm
Mounting bracket diameter	165 mm
Weight	3.5 kg
Gas in / out	Hose barb OD 32.4 mm
Oil drain	Hose barb OD 38.1 mm
Drive oil inlet	Threaded, DIN/EN/ISO 9974-1

How to contact Alfa Laval
Contact details for all countries
are continually updated on our website.
Please visit www.alfalaval.com to
access the information direct.